USGS
science for a changing world

Adapting Tracking Techniques Used on Least Terns to Coastal Species of Concern

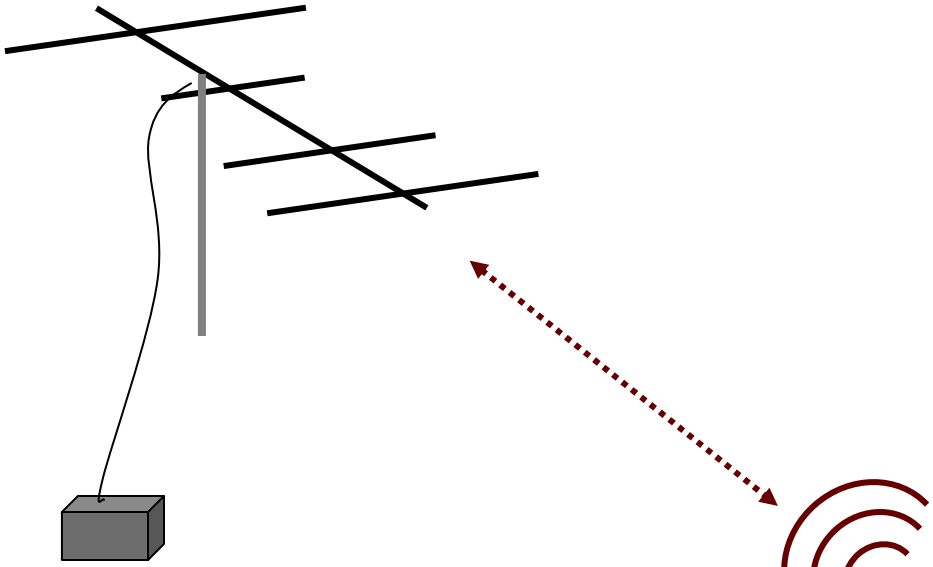
Jennifer H. Stucker
Mark H. Sherfy

Northern Prairie Wildlife
Research Center
Jamestown, ND USA

U.S. Department of the Interior
U.S. Geological Survey

Background Telemetry

- Antenna
- Receiver
- Transmitter
- Recent developments change traditional “receiver” and “transmitter”

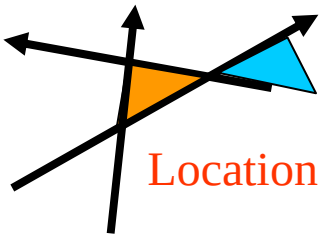


Background "Transmitters"

	Broadcast	Size	Benefits	Drawbacks
Radio-VHF ***Signal***	1 freq. to 1 transmitter 60 freq. ⇒ 60 transmitters	≥ 0.5 g	•Simple & efficient •extras •Small	•simple, •need receiving method •Z=extra weight
Coded	1 freq. ⇔ 10X transmitters	≥ 1 g	•Simple & efficient •Simultaneous detection of individuals	•simple, •need receiving method *and* <u>limited</u> manual relocation •Z=extra weight
Satellite (PTT)	To satellite	≥17 g	•Real time; •can obtain Z •no receivers	•Heavier, •power hungry, •depend on satellites •Z ± err (10-50 m)
GPS	none – stored in unit; vhf	≥ 22 g	•Real time; •can obtain Z •no receivers	•Have to retrieve to get data – or batch download via satellite. •depend on satellites •Z ± err (10-50 m)

Background Receiving - VHF

- **Fixed or mobile Bi- & Tri+ angulation**
  Requires “stationary” critter



- **Aircraft flight**
  Altitude + visibility restriction
  Infrequent relocation

- **Continuous stationary logging**
  Presence-absence limited area
  Frequent relocation
  Omni-directional
  Multi-directional

Background Choices?

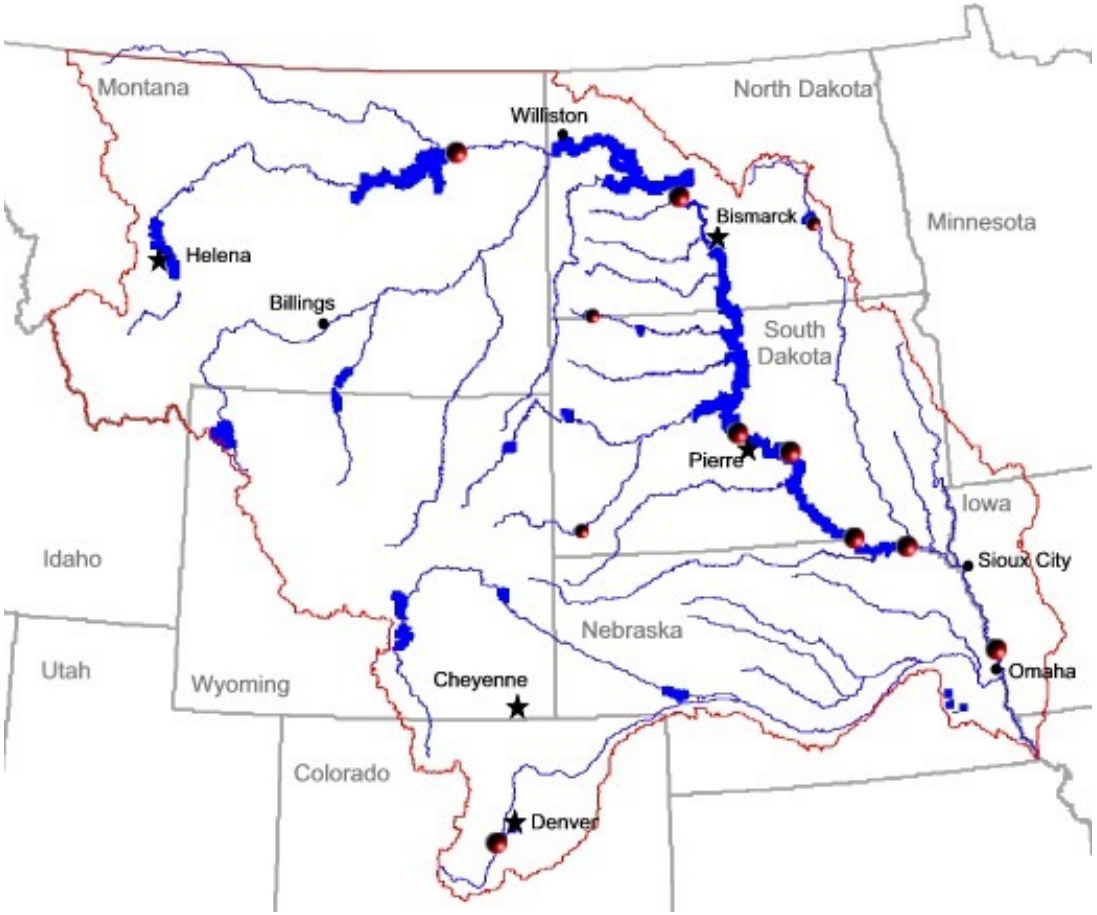
- **Chose right equipment by question.**
- **“Transmitter” size limited by size of animal.**
  - For birds <3% weight
- **Possible to make up “limitations” of VHF transmitter with receiving and monitoring choices to address research question.**

Missouri River Flows

- Historical (pre-dam):
  - Pronounced spring peak in hydrograph
  - Wide, braided channel with numerous sandbars
- Modern (post-1944):
  - 6 dams (South Dakota to Montana)
  - Reservoirs
  - Flow-managed rivers
    - Navigation
    - Hydropower
    - Flood Control
    - Recreation
    - Wildlife & Fisheries

USGS
science for a changing world

Overview Missouri River



~2,300 miles MT to MO

~700 miles channelized Sioux City, IA to Mississippi River

<u>Federally Listed</u>

- **Pallid Sturgeon**
- **Piping Plover**
- **Least Tern**

"This bird is very noysey when flying which it dose exttreemly swift…."

Meriwether Lewis, 1804

Overview Interior Least Tern

Sternula antillarum

Laridae

- **Smallest NA tern, 45 g**
- **Interior population, Endangered**
- **Ground nesting**
- **2-3 eggs**
- **Eats small fish**

- **Greatest threat – nesting habitat loss**

Least Tern population status

- **California population – Endangered**
- **Gulf and Atlantic - no Federal Listing**

map from *Birds of North America*, Thompson et al 1997.

USGS
science for a changing world

Overview Least Terns and Missouri River

- **Biological Opinion**
  1. Emergent sandbar habitat
  2. Reproductive success


NPWRC – J. Austin

- **Sandbars created for nesting habitat**

# sandbar projects	Completion year
1	2004
2	2005
1	2007-2008
3-4	2008

Overview – Least Terns on Gavins Point Reach

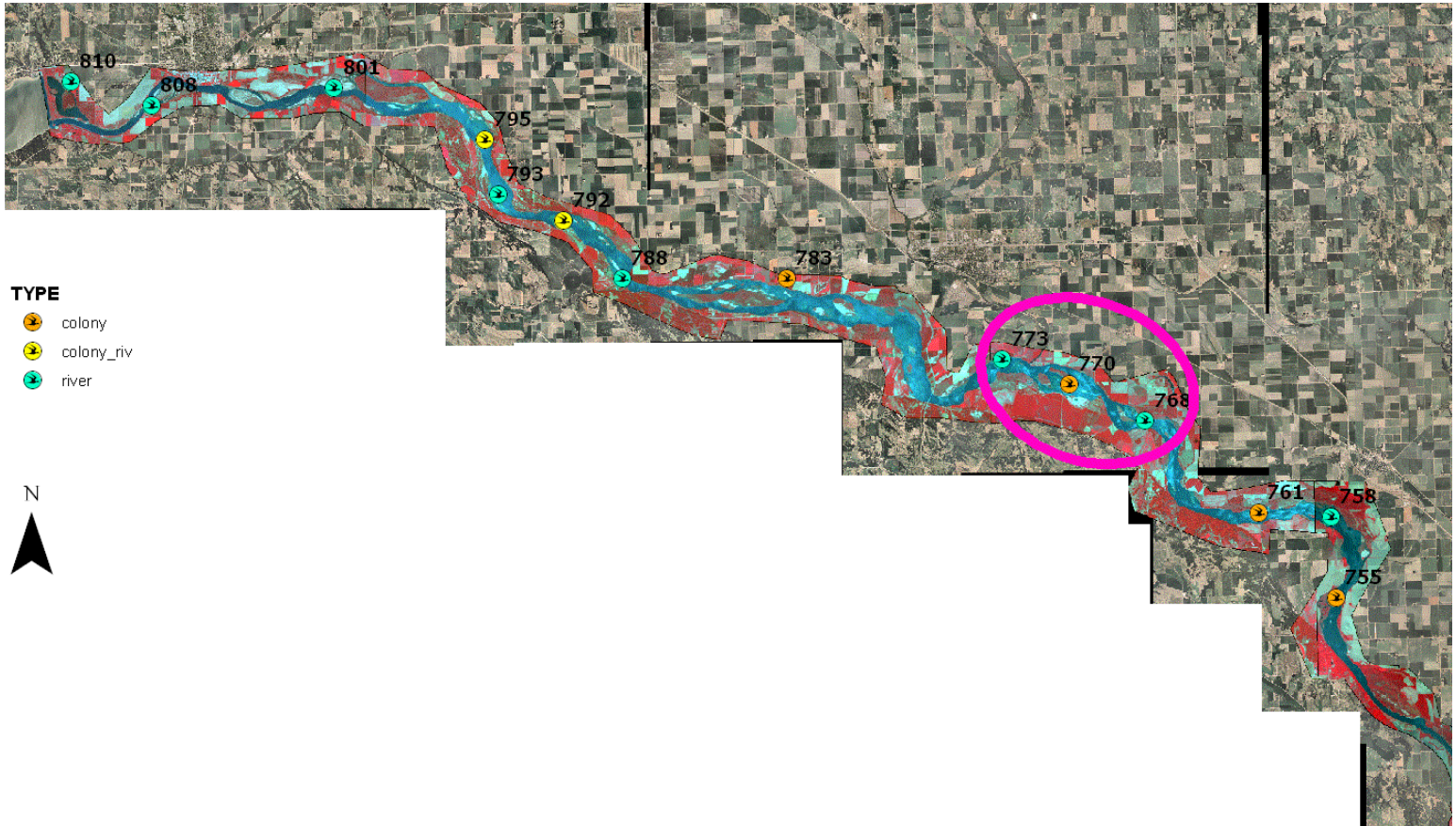
- **Least Tern use of natural(3) and created (3) sandbars**
- **Are there differences between created and natural sandbars?**

Multiple methods integrated to evaluate response

- Productivity & nesting habitat
- Foraging habitat
  - Fish sampling
- Behavior
- Movements

Methods

- Preliminary results presented are confined to birds nesting at RM 770 in 2006 and 2007, and their use of the river.



Methods

Behavior

- Colony scan samples
  ⇒ activity budgets
- Flying and foraging on river
- Spot map locations

Movements

- Telemetry
- Assessing Duration In/Out colony
- Evaluate frequency of use of river

Fish Sampling

Methods Radio Transmitters

- Failure with Least Terns
  (Massey et al. 1988)
- Recent use other terns
- Attachment trial

brookfield ZOO

Field

- Trapped on nest
- Marked
  - Bands (metal + color), transmitter, plumage color marks

Methods Telemetry

Null-peak set-up

- bi- or triangulation methods – NO

Boats surveys

- 2 – 4 surveys per week - YES

Methods Telemetry receiving

- **Stationary data loggers**

	2006	Antenna	2007	Antenna
colony	6	1	7	1
river	1 (5)	1	8	2-4

Summary preliminary

Based on data collected for Least Terns at RM 770

- Changes in colony behavior through season
- Differences foraging behavior and fish capture
- Variation in river use by foraging Least Terns
- Changes in amount of river used by breeding stage
- Document differences in nocturnal vs. diurnal activity via telemetry

Will these patterns hold for all natural and created sandbars?

- 2008 final field season; complete evaluation for all (~10) sandbars expected in 2009.

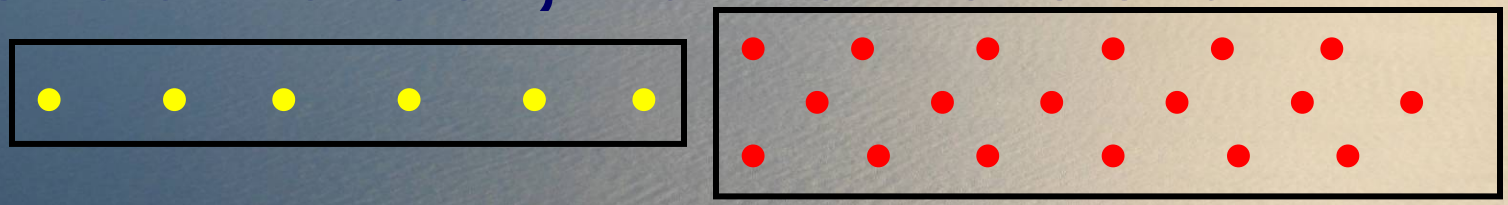
Would methods work in coastal waters?

Benefits

duration frequency timing

Challenges

- **One dimension, multi-dimensional … ?**



- **Land & fresh water *to* saltwater; tides**
- **Remote access capabilities**

Acknowledgements

Funding:

US Army Corps of Engineers, Omaha District T&E section

Sally Valdes and MMS for invitation to participate

Field Assistance:

Crew Chief, boat trainer, & bird trapper: Colin Dovichin

Crew Leaders:

2006: Brandi Skone (behavior), John Campbell (telemetry), Michael Sertle (nests)

2007: Brandi Skone (behavior), John Campbell (telemetry), Mitch Johnson (fish), Breanna Riedel (nests)

Technicians:

Alicia Andes, Amanda Bryson, Craig Davis, Michael Duchscher, Erin Ellmaker, Danielle Haak, Bryant Huso, Kaylan Kemink, Kurtis Lammers, Heidi Murray, Jessica Orr, Ashley Persinger, Chris Petersen, Dolph Prater, Laell Schulte, Jordan Wein, Brenda Jarski-Weber, Nate Emery, Janelle Feine, Mary Chris Harrison, Zach Kaiser, Jason Kottsick, Erik Schmidt, Samantha Smith, Jenny Yoo

Contact Information

Jennifer H. Stucker
USGS - Northern Prairie Wildlife Research Center
Jamestown, ND 58401
701-253-5539
jstucker@usgs.gov